

## **REMARKS/ARGUMENTS**

Claims 1 to 12 and 20 to 36 are pending in the subject application. Claims 1 to 7, 20 to 25, 35 and 36 have been rejected in the subject Office Action. Claim 1 has been amended. Claims 8 to 12 and 26 to 34 were earlier cancelled. Claims 26 to 34 have been cancelled.

In Claim 1, the combination of a dye and a non-ionic surfactant and the sole use of the surfactant as ingredients have been inserted. The basis for the amendment to Claim 1 (in this Amendment, references to numbered paragraphs are to those in the published version of the application) are as follows:

Films and the solutions from which they are made are equivalent: paragraph [0043] plus "corresponding" in paragraph [0001], lines 4 and 5.

"Produced therefrom": paragraph [0036].

"Further additives": paragraph [0042]

Non-ionic surfactants definition: original Claim 9 and/or paragraph [0041].

Combination of dye and surfactant: paragraph [0049].

Surfactant alone: paragraph [0041].

Claim 36 was amended accordingly by deleting the surfactants already mentioned in Claim 1.

Thus, applicants believe that all of the claim amendments have proper basis in the original disclosure.

The Office Action stated that the following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically

disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The Office Action stated: that this application currently names joint inventors; that in considering patentability of the claims under 35 U.S.C. 103(a), the Examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary; and that applicants are advised of the obligation under 37 C.F.R. 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the Examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The Office Action stated that the Examiner acknowledges that the arguments, on page 4 of the previous amendment, were considered and found persuasive and the rejection of Claims 1 to 7, 20 to 25, 35 and 36 has been withdrawn, but that "upon further consideration" a new grounds(s) of rejection is made" in view of Murata et al. and Serini et al. as described below, also stating that Ugaji would not have to be regarded as teaching away from the claimed invention.

Claims 1 to 6, 20 to 23, 25 and 35 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Murata et al. (U.S. Patent No. 4,173,701) in view of Serini et al. (U.S. Patent No. 4,654,411). Applicants traverse this rejection.

Applicants repeat that Claims 1 to 6, 20 to 23, 25 and 35 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Murata et al. in view of Serini et al. – that is, a combination of the two rejection references. In the Office Action Murata et al. is stated not to teach a casting process, but that this missing feature is regarded as given in Example 5 of Serini et al. The Examiner went on to state that the two applied prior art references would be analogous art as they were concerned with the same field of endeavour, namely, "the production of aromatic polyester films". The Examiner continued, thus, it would have been obvious to use the method of Serini et al. in the production of Murata et al. with the motivation being that a film of uniform thickness be produced without holes.

The Examiner's analysis is unjustified in view of the following reasons:

At the time the invention was made, there was a strong emerging need to produce high quality speakers, as applications such as downloadable ringtones, mp3-listening and video-watching with the mobile phone became a new trend in the market. All of these applications required high sound quality in combination with high mechanical strength, while there is in addition a tendency that the speakers became and become smaller and smaller, as there is less space in the electronic devices or space that is used for bigger displays. On the other hand, the requirements for sound quality and sound pressure grew and grow continuously.

The invention of the applicants – successfully and unexpectedly – found a polymer which combines good processability during film forming process by solvent casting, films showing no tensions also below 40  $\mu\text{m}$ , good thermoforming properties and excellent acoustical performance together with the required mechanical strength to satisfy the

marked needs. The assignee, LOFO, is now the only supplier worldwide that produces solvent cast films for the application as loudspeaker membrane. The claimed invention, with polyarylate, together with the other ingredients, combines all of the properties needed for these applications: Stable solutions (see paragraph [0039] to [0041] and Example 11, in comparison to Example 10, provide good peel-off, excellent acoustic properties [paragraph [0011]), have good thermoforming properties and allow the making of films in a thickness from 5 to 200  $\mu\text{m}$ , thus showing large and unexpected advantages over the prior art.

Murata et al. describes how to make speaker diaphragms by melt extrusion of polybisphenol phthalate type resins, with a possible thickness of the membranes of 40  $\mu\text{m}$ .

However, applicants developed the new invention by using solvent casting for the production of such membranes. The crucial point was to find a soluble polymer providing enough longstanding stability in solution. Film processing further requires good peel-off. The process film needs good acoustic properties, as well as good thermoforming properties. One special advantage of the present product is that the loudspeaker films can be achieved, without stretching and applying tension, of thickness less than 40  $\mu\text{m}$ , e.g., 10  $\mu\text{m}$ . Murata et al. does not describe such thin films because the melt extrusion process there would not allow for them.

Due to the given specific composition of the films and the solution for their manufacture, thus a novel and patentable class of membranes has been discovered/invented.

Serini et al., in contrast to the opinion of the Examiner, uses quite different

chemical compositions to form the films disclosed therein. These films are not intended and not appropriate for loudspeaker membranes. Their physical properties are prohibitive, e.g., the glass temperature  $T_g$  in the table, column 5, is much too high to allow for a conventional thermoforming process which is, however, needed to achieve the special shape of loudspeaker diaphragms. Thus, the diaphragms surprisingly have totally different properties, based on the intention in Serini et al. to produce highly heat resistant electrical insulating films, e.g., for condensers or strip conductors (see Col. 3, lines 41 and 42, etc.).

Therefore, there would not have been any motivation for the person skilled in the art, or the person ordinarily skilled in the art to combine Murata et al. and Serini et al. to arrive at the present invention. The claimed invention is not obvious to one ordinarily skilled in the art (at the time the invention was made).

The Office Action stated: that considering Claims 1 to 4, 6, 20, 21, 25 and 35, Murata et al. teaches a diaphragm (1:6-7) formed from a polyarylate film (Example 2) where the film is produced from the reaction of bisphenol A and a mixture of isophthaly dichloride and terephthaly dichloride/formula (I) where  $R^1$ - $R^4$  are hydrogen and  $R^5$ - $R^6$  are methyl (Example 1). Applicants have shown above that the combination of two references rejection fails.

The Office Action stated: that Murata et al. does not teach the film as being produced by a casting process; that, however, Serini et al. teaches forming a film of an aromatic polyester through a casting method involving casting the polymer solution onto a drum roller/continuous substrate, predrying, removing and drying the film (Example 5); that Murata et al. and Serini et al. are analogous art as they are concerned with the same

field of endeavor, namely the production of aromatic polyester films; and that it would have been obvious to a person having ordinary skill in the art at the time of invention to have used the method of Serini et al. in the production of Murata et al., and the motivation to do so would have been, as Serini et al. suggests, to produce a film of uniform thickness that is free of holes (Example 5). Applicants have shown above that this statement is in error, and does not support a Section 103(a) rejection.

The Office Action stated considering Claims 5, 22 and 23: that Murata et al. teaches the diaphragm as having a thickness of 40  $\mu\text{m}$  (Example 2). This does not make applicants' invention as a whole obvious.

Claim 36 has been rejected under 35 U.S.C 103(a) as being unpatentable over Murata et al. (U.S. Patent No. 4,173,701) in view of Serini et al. (U.S. Patent No. 4,173,701) in view of Serini et al. (U.S. Patent No. 4,654,411) as applied to Claim 1 above, and further in view of England et al. (U.S. Patent No. 6,476,158). Applicants traverse this rejection.

Also, regarding the combination of Murata et al. and Serini et al. with England et al. (US 6,476,158), obviousness Claim 36 cannot be found for the following reasons, for example:

In the case of England et al., there would not have been any clue that the present invention also required the non-ionic liquids incidentally also found in the dyes mentioned which is a surprising core of the present invention. Of course, the named dyes have been used in other applications, as some are standard dyestuffs. But they only had been used so far with the target to color any other substrate, and not to prevent the crystallization, which is the totally unexpected finding in the present invention which allowed them to

make solvent casting available as an option for the thermoformed diaphragms hitherto not achievable with polyarylate resins. The target in England et al. was completely different, as they were searching for a colorant which can withstand the high temperatures during the extrusion process and which has good weather resistance (high temperatures, water, UV irradiation) (see abstract in England et al.). All of these purposes are completely irrelevant for the solvent-casting process and the application as loudspeaker membranes:

While someone might have put in any dye to achieve some color properties of the loudspeaker membranes, the incentive would have been low; first, the diaphragms are encased typically and thus no coloring or esthetical appearance is necessary, and second, England et al.'s high temperatures are used in the extrusion process, while solvent casting does not apply high temperatures or melting, and the devices in which the present thermoformed diaphragms are used are usually themselves not weather-proof. Also, England et al. does not distinguish between soluble and non-soluble colorants as both are useable for extrusion, while for solvent casting according to the present claim the dyes are dissolved. Pigments or colorants not dissolved would clog the filters and may even create boundaries in the film, which could act as predetermined breaking points if the membrane is oscillating during use of a speaker.

Thus, the incentive to produce the diaphragms presently claimed is also not obvious over a combination of Murata et al., Serini et al. and England et al.

The Office Action stated considering Claim 36: that Murata et al. and Serini et al. collectively teach the diaphragm of Claim 1 as shown above. Applicants disagree for the above reasons.

The Office Action stated: that Murata et al. does not teach the film as including an

additive; that, however, England et al. teaches adding solvent yellow 93 to a polyarylate resin (3:33-42); that Murata et al. and England et al. are analogous art as they are concerned with the same field of endeavor, namely, polyarylate resin compositions; and that it would have been obvious to a person having ordinary skill in the art at the time of the invention to have added the colorant of England et al. to the resin of Murata et al., and the motivation to do so would have been, as England et al. suggests, to color the resin with a colorant having good color retention and processing stability (3:33-39). This statement is in error and does not make applicants' invention as a whole obvious.

Claims 7 and 24 have been rejected under 35 U.S.C.103(a) as being unpatentable over Murata et al. (U.S. Patent No. 4,173,701) in view of Serini et al. (U.S. Patent No. 4,654,411) as applied to Claims 5 and 6 above, and further in view of Ugaji et al. (U.S. Patent No. 4,281,223). Applicants traverse this rejection.

Finally, also the publication of Ugaji et al. (US 4,281,223) does not add to Murata et al. and Serini et al. (also not in combination with England et al.): For every person skilled in the art, it is well known that, at the time the invention was made, there were (and still are) three important groups of loudspeaker membranes: paper-based, metal and polymer based (as also mentioned by Ugaji et al.). It is clear that there existed already a large variety of speaker with polymer-based membranes. Membranes made from PET (poly(ethylene-terephthalate)) are a good example, as these had been widely used for the same purpose. However, sound quality of such membranes is limited (see paragraph [0002]) so today such speakers are only used for low end applications. There are also other polymers in use, like PEN (poly(ethylene naphthalate)) or PEI (poly(ethylene imide)). All of them have their limitations due to the native properties of the polymer



composition and the productions method (all of them are extruded, and most of them are biaxially oriented, which creates a lot of "frozen tensions" within the films, thus negatively affecting the formability and sound properties).

Serini et al. would not allow for thermoforming and thus not induced to come to the present invention at all (also not with England et al. where only molding an extrusion is described for the processing, no casting and no thermoforming).

Given the amendments to the claims and arguments presented above according to which neither of the prior art documents alone or in combination with any one or more of the others makes the present invention obvious, it is confidently believed that the present invention deserves allowance which is therefore seriously solicited.

Thus there would not have been any inventive to the ordinarily skilled person to use such dyes for solvent-cast diaphragms.

The Office Action stated considering Claims 7 and 24: that Murata et al. and Serini et al. collectively teach the diaphragm of Claims 5 and 6 as shown above. Applicants disagree.

The Office Action stated: that Murata et al. does not teach the diaphragm being used in one of the claimed devices; that, however, Ugaji et al. teaches using a diaphragm made from a resin film (2:63-3:7) in a loudspeaker or microphone (3:40-51); that Murata et al. and Ugaji et al. are combinable as they are concerned with the same field of endeavor, namely acoustic devices made from resin film diaphragms; and that it would have been obvious to a person having ordinary skill in the art at the time of invention to have used the diaphragm of Murata et al. in a microphone or loudspeaker as in Ugaji et al., and the motivation to do so would have been, as Ugaji et al. suggests, to provide

an electro-acoustic transducer (1:8-21). This statement is in error, and does not show applicants' invention as a whole being obvious.

The Office Action stated in response to applicants' arguments: that applicants' arguments, see pages 8 to 11, filed April 29, 2009, with respect to the rejection(s) of Claim(s) 1 to 7, 20 to 25, 35 and 36 under 35 U.S.C. 103 have been fully considered and are persuasive; that, therefore, the rejection has been withdrawn; and that, however, upon further consideration, a new ground(s) of rejection is made in view of Murata et al. and Serini et al. The new obviousness rejection fails as applicants have shown above.

The Office Action stated: that applicants' arguments filed April 29, 2009 have been fully considered but they are not persuasive, because:

Applicants' argument that Ugaji et al. teaches away from the claimed invention is not persuasive; the fact that Ugaji et al. teaches other materials than the claimed polyarylate is not sufficient to teach away from using a polyarylate; in order for a reference to teach away from the invention, the reference should provide a disincentive to using the claimed resin; and, as Ugaji et al. does not mention polyarylate resins, it cannot provide a disincentive to using them in a diaphragm.

This statement is in error. The issue of directing away is not as narrow as asserted by the Examiner.

Reconsideration, reexamination and allowance of the claims are requested.

Respectfully submitted,

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